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## Taxodium distichum in the Paleozoic area of Alabama

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Of the two species of *Taxodium* in the eastern United States, the smaller one, *T. ascendens* (or *imbricarium*), the pond cypress, seems to be strictly confined to the coastal plain, from Dismal Swamp to eastern Louisiana. The other, *T. distichum*, which is better known, and sometimes distinguished as the river cypress, has a much wider range, and extends a little outside of the coastal plain in a few places, notably along the Tallapoosa, Coosa and Tennessee Rivers in Alabama and the Wabash in Indiana,<sup>1</sup> besides a few west of the Mississippi River which need not be specially considered here.<sup>2</sup>

Its inland or northern limit may be determined partly by some climatic factor, such as the average or minimum temperature or length of growing season; but one should be cautious in making such an assumption, for both species of *Taxodium*, as well as many other trees, are successfully cultivated considerably farther north than they grow naturally, apparently indicating that when a tree is protected from competition it can stand more extreme conditions of climate (and soil) than it does in its natural associations.

More likely the partiality of *Taxodium distichum* to the coastal plain is connected with the fact that alluvial swamps are much more common there, in comparatively level areas of unconsolidated strata, than in the hill country, with relatively hard rocks of Paleozoic age and older. It is an old species, geologically speaking, and its present colonies outside of the coastal plain may have had their start many thousand years

<sup>1</sup> See C. C. Deam, *Trees of Indiana*, ed. 2, p. 30. 1921.

<sup>2</sup> For notes on the distinguishing characteristics of these trees and their distribution see *Bull. Torrey Club* 29: 383-399. 1902; 32: 105-115. 1905; *Pop. Sci. Monthly* 85: 351-352, 356-357. 1916; *Geol. Surv. Ala., Monog.* 9: 61-67. 1928.

ago, when the coastal plain deposits extended farther inland than they do now.

In Alabama the locality for *Taxodium distichum* farthest removed from the coastal plain, and the only one north of the Tennessee River, as far as known, is on Cypress Creek in Lauderdale County. There it is common for a few miles along the creek near its mouth, just west of Florence, about 400 feet above sea-level, but I have not observed it on the river near by. According to the geological maps the nearest coastal plain deposits are about 15 miles away (some west and some south), and all on uplands, at least 200 if not 300 feet higher. Presumably these deposits (of the Tuscaloosa formation, of Cretaceous age) once filled the Tennessee River lowlands too, but have been removed by erosion.

There is also a good deal of cypress along Bear Creek in Colbert County, nearly all the way down to its mouth, but little or none along the river adjacent, probably because the seasonal fluctuations of the river are too great.<sup>3</sup> This creek rises in the plateau region, and enters the Tennessee River from the south at the Alabama-Mississippi line, after crossing the state line a few times in its northward course. According to the 1926 geological map of Alabama its bed is all in Paleozoic rocks, mostly limestones, but the Tuscaloosa formation, consisting mostly of sand, gravel and clay, caps the hills on both sides of it close by. The accuracy of some of this mapping is open to question, however, as will be shown below.

The government soil map of Franklin County, Alabama (date of publication not indicated, but apparently 1932) shows a large "Cypress Slough" in the western part of the county, about three miles east of Red Bay and a mile northeast of Bear Creek; and as I had no previous record of *Taxodium* in that county, I visited the place on March 18, 1933. The geological map shows the creek at that point to be bordered by a strip of Paleozoic (Mississippian) limestone at least half a mile wide on either side; but I found a steep gravelly bluff on the south side and flat loamy bottoms about a mile wide and mostly culti-

<sup>3</sup> See Science II. 36: 760-761. Nov. 29, 1912. Both the Cypress Creek and the Bear Creek localities, which I had known since 1906, were inadvertently omitted from the distribution map of *Taxodium* on page 64 of my Alabama tree volume previously cited.

vated on the north side; typical coastal plain features, with no sign of any limestone. It is quite possible that there is limestone near enough to the surface there to influence the tree growth (for *T. distichum* seems to be rather fond of limestone, so to speak), but how the geologists could have detected it is a puzzle.

The particular cypress slough shown on the soil map was not identified, and may have been partly destroyed by drainage and cultivation since the field work was done, about 1927; but *Taxodium distichum* was scattered over the bottoms in suitable places, and usually associated (as it often is) with *Nyssa uniflora*, which I likewise had not seen in that county before, not having been far enough away from the railroads.<sup>4</sup>

The first Alabama locality mentioned is in the Tennessee Valley region, and the Franklin County one is on a stream draining into the Tennessee River, though it is on coastal plain deposits. A cypress swamp in the Appalachian Valley (which extends without interruption from New York to Alabama) now remains to be described.

The present paved highway from Birmingham to Tuscaloosa, about half way between those cities, at the boundary between Jefferson and Tuscaloosa Counties, crosses Cooley Creek, a small tributary of the Cahaba River. The locality is in that part of the Appalachian Valley known locally as Jones Valley, a few miles from the place where the Paleozoic rocks of the valley dip out of sight beneath the coastal plain deposits. The various formations crop out in narrow belts trending north-east-southwest, and the creek cuts across them approximately at right angles. The road at that point runs parallel to the geological belts, through a level calcareous valley, skirting the southeastern base of a chert ridge, with several springs issuing from it, especially about a quarter of a mile southwest of the creek in Tuscaloosa County. These springs give rise to small streams running southeast across the gently sloping valley floor, and soon joining the creek, in a swampy area probably inundated by the creek in rainy weather. It needs no chemical analysis to show that the spring water is calcareous, for that is sufficiently indicated by the presence of water-cress and periwinkle shells.

<sup>4</sup> See Geol. Surv. Ala., Monog. 9: 282-284. 1928.

At the point described, along these small streams, close to the road, a gently sloping area of three or four acres is occupied by a pretty dense cypress swamp, with perhaps 200 trees. Just here the modern highway follows the route of the old Huntsville road, which was in use 100 years ago, and must have been traveled at various times by several geologists, and others who should have known cypress when they saw it, but apparently no mention of this outlying colony ever got into print. (About a mile to the southeast there is a main line of railroad, built about 1870, but the cypress is not visible from that.) I had traveled the highway by automobile several times in the last few years, but somehow never noticed the *Taxodium* until I passed that way on a bus on my way back from New York on Oct. 26, 1932.

According to the geological map, it is only about three miles down the valley from this point to the nearest area of the Tuscaloosa formation, though some of the Paleozoic strata can be traced at least 15 miles southwestward before they finally disappear. The cypress swamp is not immediately adjacent to Cooley Creek, but separated from it by a belt of ordinary creek-bottom vegetation, and just what causes the difference is not clear. I went into the swamp on Jan. 29, March 12, April 18, and Oct. 19, 1933, and made the following notes on the composition of the vegetation.

*Taxodium distichum* outnumbers by far all other trees. Next in abundance is *Liquidambar styraciflua*, and there are a few trees of *Salix nigra*, *Fraxinus americana*, *Ulmus alata*, and *Celtis* sp., the last near the outer edge. Small trees are represented by *Morus rubra* (near the edge) and *Carpinus caroliniana*. *Berchemia scandens* and *Rhus radicans* are common woody vines, and there are a few specimens of *Bignonia* and *Parthenocissus*. The only shrub observed was *Sambucus canadensis*, and that may not have been there always, as it is noted for its weedy tendencies.<sup>5</sup> The most abundant herb is *Senecio lobatus* (or *glabellus* as it is now called), and it is very conspicuous in April. About a dozen other herbs were noted once each, and there are also a few weeds and mosses.

There are some puzzling peculiarities about the growth of

<sup>5</sup> See discussion of this point by Asa Gray and others in *American Naturalist* 1: 493-494; 2: 38-39; 3: 282. 1867-1869.

the cypress. Even from the highway one can see that none of the trees have the flat top that characterizes both species of *Taxodium* in old age,<sup>6</sup> and one might infer from that that the trees had been planted by some early settler, perhaps within 100 years. This neighborhood, known as Bucksville, has been settled something over 100 years, and in a cemetery close by there are several tombstones dated between 1830 and 1840. But just what motive the settlers could have had for planting a grove of cypress in a swampy place, about thirty miles from any other known locality for the species, is not clear.



Interior of the Bucksville cypress swamp, Tuscaloosa County, showing two of the larger trees, many smaller ones, and numerous knees a foot or less in height. Jan. 29, 1933.

On going into the swamp I found that about half a dozen of the trees were decidedly larger than the rest, about five feet in diameter at the ground and three feet above the enlarged butt, and those may be several hundred years old, though *Taxodium*, like many other trees, grows faster when it has plenty of room than when it has strong competition from other trees. Curiously enough, these larger trees all have many dead limbs down to within a few feet of the ground, which strongly suggests that they were once in a comparatively open place, and the lower limbs

<sup>6</sup> See Science II. 36: 760-761. Nov. 29, 1912; Geol. Surv. Ala. Monog. 9: 61, 62, 1928.

died after younger trees grew up and shaded them. The trees from one to two feet in diameter all have smooth straight trunks (as shown in the illustration), as a result of crowding.

One possibility is that there was once a normal cypress swamp here, and the early settlers cut out all but a few of the trees, which then put out lateral branches which flourished until a new crop of younger trees made it too shady for them. But cypress is such a durable wood that if any trees had been cut within a century or two their stumps should still be in evidence; but I saw no stumps.

Another possibility is that this was once a spring-fed pond, or meadow, with a few scattered cypresses, and that sediment brought down by the creek since some of the surrounding country was cleared has raised the ground surface and made conditions more favorable for the germination of *Taxodium*, and allowed a crop of younger trees to spring up. And possibly this is all the human interference there has been, though it would be remarkable if there had not been more, with people living close to the swamp for more than a century.

As cypress is a rather valuable wood, it is a wonder that this swamp was not invaded by lumbermen long ago. And as it is now in plain sight from a much-traveled highway, some such fate may overtake it almost any day. But if it should escape exploitation for another generation or two, and be studied again at the end of that time, perhaps some interesting developments could be noted.

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